DOCUMENT RESUME

ED 123 821 EC 090 012

AUTHOR Briggs, Richard G.
TITLE Use of SIGGS Model for Decision-Making in School Programs: Preliminary Identification of Information-Theoretic Variables.
PUB DATE Apr 76
NOTE 25p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, California, April 23, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Administration; *Conceptual Schemes; Elementary Secondary Education; Exceptional Child Education; *Handicapped Children; *Models; *School Services; *Special Education
IDENTIFIERS *SIGGS Model

ABSTRACT

Described is the nega-system and the system within Specialized Educational Services which relate to educational decision making and the flow of exceptional children into and out of special education in the Madison (Wisconsin) Public Schools. Topics covered include factors affecting the operations of the nega-system; three categories of services offered by the district (such as teaching services directly delivered to children); statistics relating to Special Educational Services; information-theoretic variables from the SIGGS Theory Model; and possible relations between the model and program evaluation. (Author/SB)

********** ********** **********
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
********** ********** **********

ED123821

Use of SIGGS Model for Decision-Making in School Programs: Preliminary Identification of Information-Theoretic Variables.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

by

Richard G. Briggs
Specialized Educational Services
Madison Public Schools
Madison, Wisconsin

Presented in Symposium:
The SIGGS Model and Education
Annual Meeting of the American
Educational Research Association
San Francisco, CA 23 April 1976

EC090012

Abstract

The system of concern is the flow of children into and out of special education in Madison, Wisconsin. The paper presents overall/descriptive data of the nega-system (Madison Public Schools) and the system within Specialized Educational Services. A preliminary identification of information-theoretic variables from the SIGGS Theory Model is set forth. A brief description of possible relations between this theoretic model and program evaluation is presented.

This paper describes work in progress in application of the SIGGS Theory Model.

A nega-system is briefly described to set the context for the system of interest. One aspect of the system of interest is described using information theoretic categories from the SIGGS Theory Model. Then a preliminary set of classifications and categories is set forth as a possible beginning. Finally, the relationship of the SIGGS Theory Model and formative evaluation is described by using one example.

The system of concern to this paper is the Division of Specialized Educational Services within Madison Public Schools. Therefore, the nega-system to Specialized Educational Services is Madison Public Schools. A brief description of the nega-system follows.

Nega-system: Madison Public Schools

Madison Public Schools is a combined school district which includes children from political entities other than the City of Madison.

In terms of numbers of persons there are approximately:(1)

30,500 students
1,778 teachers, librarians, counselors, psychologists, social workers(2)
131 administrators
350 secretaries, aides, and other technical workers
269 custodians, painters, carpenters, etc. devoted to building maintenance

The following factors impinge on the system and affect its operations:

a) There is a strong, militant teachers' union which bargains aggressively for wages and working conditions.

b) All of the other employee groups, with the exception of middle management, are also organized into collective bargaining units.

c) The state Department of Public Instruction imposes rules and guidelines. Two of which are:

   i) The imposition of a spending limit by legislative mandate.

   ii) A requirement that 180 days of teaching service must be delivered.

d) As a whole the student enrollment is declining although there are bulges at the middle school levels.

e) The majority of the Board of Education is both fiscally conservative and politically sensitive.

The budget for 1976 totals approximately $55 million. About 91% of that budget goes for what are considered 'inflexible' costs such as salaries and fringes, debt service, and utilities. Of the remaining 9%, 6% is already committed to salary increases before the next round of bargaining begins. The district's administrators perceive flexibility in resource allocation only in areas of capital maintenance and improvement, supplies and equipment, transportation and other costs, research and development, curriculum development, staff development and evaluation. As of September 1973 there were 31,537 students, 1,686.3 teachers, and 133.5 administrators. By September 1976, it is estimated that enrollment will decline to 30,500 students; and the budget allocates 1,777.98 teachers and 130.5 administrators. The following ratios are of some interest:

	Sept. '73	Sept. '76	'76/'73
'Teacher'/student	0.0535	0.0583	1.0902
Administrator/student	0.0042	0.0043	1.0108
Administrator/'teacher'	0.0792	0.0734	0.9271

The increase in the number of teachers for these periods has come about because there will be -36.15 elementary teachers, +2.95 middle school teachers, +3.18 high school teachers and +121.78 special education teachers.

Administratively the district is organized into three broad, unofficial categories depending upon the directness with which the administrative unit delivers teaching services to children.

The first category directly delivers teaching services to children. The school district is divided into four attendance areas surrounding each of the four high schools. Each attendance area has an administrative head, the Area Director. Within each attendance area there are two to three clusters surrounding the middle schools (ten in the city overall). Each cluster draws its students from three to six elementary schools (33 in all). The Division of Specialized Educational Services is an administrative unit headed by a Director on the sme hiearchical level as the Area Directors.

The second category is indirectly concerned with the delivery of teaching services in that it focuses primarily on teacher training, curriculum development, and research and evaluation. These administrative units are the Research and Development Department (which also includes safety education, athletics and Title I) and Centralized Media Support Services.(3)

The third category includes Employee Services, Administrative Services, Printing Services, Business Services, Building Services, Warehousing and Distribution, Food Services and School-Community Recreation.

In terms of titles clean line and staff differentiations cannot be made although the following hiearchy generally obtains: Superintendent, Assistant Superintendent,

Director and Assistant Directors. Under these there may be managers, supervisors, coordinators or principals depending on the administrative unit. It is of little point to comparatively rank them because job descriptions vary widely. For example, the title 'coordinator' may apply to a person with substantial responsibility for hiring or firing of personnel or to a person who has little such responsibility. For the budget categories (i.e.d. administrative units) above the following titles apply:[4] (# = Number of people in September 1976 budget.)

I. Elementary, middle, and high school instruction: Area director (4), principal (37), assistant principal (16) (high schools only).

II. Specialized Educational Services: Director (1), Coordinator (6.5).

III. General District Administration: Superintendent (1). (Area Directors (4) in (I) above.)

IV. Reseach and Development Department: Director (1), Coordinator (17), Supervisor (1), Consultant (1).

V. Centralized Media Support Services: Manager (1), Supervisor (3).

VI. Human Relations Department: Director (1), Coordinator (1), Consultant (1).

VII. Public Information: Coordinator (2).

VIII. Employee Services: Director (1), Supervisor (3), Registrar (1), Office Manager (1).

IX. Administrative Services: Assistant Director (1), Manager (1), Administrator (1).

X. Printing Services: Manager (1).

XI. Business Services: Director (1), Assistant Director (2), Comptroller (1), Supervisor (3).

XII. Building Services: Assistant Director (1), Supervisor (3), Foreman (4), Leadman (1).

XIII. Warehousing and Distribution: Leadman (1).

XIV. Food Services: Supervisor (1), Manager (4.5).

XV. School-Community Recreation: Director (1), Coordinator (5), Supervisor (2), Leader (4).

This data is presented to describe the nega-system to the system of interest, Specialized Educational Services (SES). Before passing on, some notions concerning interesting contrasts in variables and hypotheses can be noted in terms of application of the SIGGS Model.(5) Refer to figures 1a and 1b.

- What changes in amount of information (H function)(11) come about under conditions of declining as opposed to increasing enrollment in the system's Demand, Resource, Supply, Depletion, and Storage.

- What changes in the amount of shared information (T function)(11) come about under similar contrasting conditions in the system's Demand Transmission (FI), Supply Transmission (FO), Feedthroughness (FT) and Feedbackness (FB).

- In a period of declining enrollment and budget squeeze, the initial response of the organization will be to protect as many of its people as it can. Therefore, more elaborate organizational structures will emerge with the appearance of more hiearchical levels. If both pressures continue, then the organization will then reduce complexity and hiearchical levels. These can be examined using the graph theory components of SIGGS model.

Specialized Educational Services

Specialized Educational Services delivers instructional services to those children having exceptional educational needs (EEN) as determined by an ad hoc unit called the multi-disciplinary team. The school district is obligated to serve EEN children from the age of three to twenty-one. EEN is if a child has a handicapping

condition[6] and (in addition) requires special educational services which supplement or replace regular education in order for the child to attain his/her full potential.[7] The state Department of Public Instruction uses national incidence figures to limit the number of programs it approves in each of these areas. Children from age zero to three may, but not must, be served if the district so elects.[8]

This state of affairs has come about because a law was passed in 1973 which mandated special education service. Changes since 1973 are summarized here:

	Sept. 73	Sept. 74	Sept. 75	Sept. 76
Children	751	804	1062	1765 (est)
Teachers	134.40	213.65	229.20	256.10
Administrators	6.0	-	8.0	7.5

Ratios similar to those for all Madison Public Schools are:

	Sept. 73	Sept. 76	76/73
Teacher/student	0.1790	0.1451	0.8108
Administrator/student	0.0080	0.0042	0.5319
Administrator/teacher	0.0446	0.0293	0.6560

Straightforward comparisons are confused because both regular and special education have substantial numbers counted as 'teachers' who do not teach. As an estimate, the following figures apply:

	Regular Education	Special Education
Teacher/student	0.0435	0.1049
Student/teacher	22.9892	9.5329

The organization of Specialized Educational Services is as follows:

I. Director. This person has overall responsibility for the planning, implementation, and evaluation of special education programs. He reports to the Assistant Superintendent and sits on the Superintendent's Cabinet, hence having input into system wide operations.

II. Coordinator. There are seven of these persons who have administrative responsibility for planning, implementing, and evaluating categorical programs.

II.a. Programs for Orthopedically Handicapped, Trainable Mentally Retarded, Multiply and Severely Handicapped.

II.b. Programs for Early Childhood (In addition, this person is responsible for administering delivery of Psychologic, Social Work, and Nursing Services.)

II.c. Programs for Hearing Impaired, Speech and Language Disabilities, School Age Maternity. (In addition, this person is responsible for administering the delivery of Speech and Language Services to the district as a whole.)

II.d. Programs for Visually Impaired, Educable Mentally Retarded. (This person also administers educational programs for hospitalized students.)

II.e. Programs for Emotionally Disturbed. (This person also administers programs for homebound students and the adolescent center.)

II.f. Programs for Learning Disabilities.

II.g. Program Evaluation. (This person has responsibilities for program evaluation for the SES Division.)

In terms of relating to other components of Madison Public Schools, four of the above coordinators are also members of an attendance area cabinet.

III. Program Support Teachers, High School Special Education Department Chairpersons, Program Based Psychologists and Social Workers, Other Specialists. These persons have no official responsibility in terms of budgeting and personnel except as they serve as assistants to a coordinator. In general they serve liaison and communicative functions, serve on some multi-disciplinary teams, provide curriculum and teaching method expertise, arrange the distribution and dissemination of materials, and provide inservice. There are 40.5 such persons distributed among most of the programs listed in II above. There is, conceptually, a sharp differentiation between program based psychologists/social workers and program support teachers. The high school department chairpersons' job has been newly created and is currently ill-defined.

IV. Classroom Teachers. There are approximately 200 classroom teachers in the program areas (also known as categorical areas) mentioned in II above.

V. Classroom aides and secretarial and other. There are approximately 64 such persons distributed among most of the programs listed in II.

Administratively, the SES Division follows the categorical areas although the past year has seen some cooperative working arrangements among coordinators. In general staff allocations are assigned to particular locations following a planning process which starts internally within the division and then expands to area and cluster meetings.(9)

In summary, Specialized Educational Services has undergone a considerable growth over the last three years while the district has experienced a decline in enrollment. Current referral figures indicate that some further growth will occur,

particularly in programs for children ages zero to five, and in learning disabilities and emotional disturbance. This growth will be difficult because the Superintendent and the Board of Education are inclined to resist program expansion. Furthermore, SES programs already enroll a proportion of children within a few points of national incidence figures, hence, the state Department of Public Instruction will begin to oppose rather than encourage expansion.

The system within Specialized Educational Services which will be examined in more detail in this paper is the student system defined as the process of intake, delivery of teaching, and output. Current efforts are being made to put this data in computer retrieval form. The following SIGGS variables may be identified:(5)

I. System Demand is the children who have been referred or discovered by screening or referred for services by neighboring districts who do not operate programs for low-incidence handicapping conditions.

II. System Resource is the children enrolled in SES programs.

III. System Supply is the children ready to return to non-SES programs or to graduate because they have reached an upper age limit.

IV. System Depletion is the children returned to non-SES programs or who have left because of reaching an upper age limit.

V. System Storage is the children who have entered an SES program and are not considered ready to leave an SES program.

VI. System Demand Transmission is performed by the multi-disciplinary team and the responsible SES Coordinator.

VII. System Supply Transmission is performed by the multi-disciplinary team, the responsible SES Coordinator, and the receiving unit's personnel.

VIII. System Spillageness is restrictions on the multi-disciplinary team, the space available in programs, the availability of programs, and/or parental denial of permission to place the child.

IX. Nega-system Spillageness is restrictions on the multi-disciplinary team, the space available in receiving programs, the availability of receiving programs, and parental denial of permission.

X. School Demand Transfer is the children referred or screened as having suspected EEN who do not have EEN as determined by the multi-disciplinary team; or whose parents deny permission for the multi-disciplinary team to assess EEN.

XI. System Supply Transfer is the children who return to special education programs either because they were not placed in a non-SES program, they were placed but have returned, or parents deny permission.

XII. System Filtrationess is rules and regulations setting criteria for referrals and screening.

XIII. System Hierarchically Orderness is the levels of professional positions with respect to SES administraiton.

XIII.a. One affect relation is governance.

Variables which relate to properties of the SIGGS Model which come from the Graph

Theory component have not yet been [illegible]

The way in which [illegible] is preliminary and results [illegible] schemata are currently being [illegible] multi-disciplinary team [illegible] This schema adapts an information management system [illegible] progress through a curriculum. [illegible] data base monitoring movement [illegible] will be linked with measures of student progress.

Family of classifications A

Classification A.1. Children who have not been referred or have been [illegible] as having progressed [illegible]

A.1.1. Age categories

A.1.2. Grade categories

A.1.3. [illegible]

A.1.4. Behavior categories

A.1.5. [illegible]

A.1.6. Demographic categories

A.1.7. Other

Classification A.2. Children who have been referred or have been [illegible] as having progressed [illegible] System Demand)

A.2.1. Age categories

A.2.2. Grade categories

A.2.3. [illegible]

A.2.3.1. Behavior categories.

A.2.3.2. Academic categories.

A.2.4. Geographic categories.

A.2.5. Other.

A.2.6. Suspected EEN categories.

Classification A.3. Children who have been placed in special education programs (Nega-system Depletion, System Resource).

A.3.1. Age categories.

A.3.2. Grade categories.

A.3.3. Achievement categories.

A.3.3.1. Behavior categories.

A.3.3.1.1. Multi-disciplinary team recommendations categories.

A.3.3.2. Academic categories.

A.3.3.2.1. Multi-disciplinary team recommendations categories.

A.3.4. Geographic categories.

A.3.5. Other

A.3.6. EEN categories.

A.3.6.1. Intensity of service categories.

A.3.6.2. Disability categories.

Classification A.4. Children to be returned to non-special education programming (Nega-system Demand, System Supply).

A.4.1. Age categories.

A.4.2. Grade categories.

A.4.3. Achievement categories.

A.4.3.1. Behavior categories.

A.4.3.1.1. Multi-disciplinary team recommendations categories.

A.4.3.2. Academic categories.

A.4.3.2.1. Multi-disciplinary team recommendations categories.

A.4.4. Geographic categories.

A.4.5. Other categories.

A.4.6. EEN categories.

A.4.6.1. Intensity of service categories.

A.4.6.2. Disability categories.

A.4.7. Non-special education component changeness categories.

A.4.7.1. Alterations in practice categories.

A.4.7.2. Support services categories.

Classification A.5. Children assigned to non-SES instructional units (Naga-system Supply, System Depletion).

A.5.1. Age categories.

A.5.2. Grade categories.

A.5.3. Achievement categories.

A.5.3.1. Behavior categories.

A.5.3.2. Academic categories.

A.5.4. Geographic categories.

A.5.5. Other categories.

...

A.5.7. Non-special education component changeness categories.

A.5.7.1. Alterations in practice categories.

A.5.7.2. Support services categories.

The next steps in applying SIGGS Model to this system are set forth here. First, subcategories within each of the categories A.i.j. must be clearly defined. Some will present considerable difficulty because agreement among various responsible administrators is required, e.g., achievement, 'other', and changeness of non-SES programs. Second, considerable work must be done to identify affect relations. With respect to this sytem the following affect relationships seem possible:

I. There exists a governing relation between programs and SES as a whole.

II. There is assessment relation between components as they perform multi-disciplinary team functions.

III. There is a legitimizing relation as when the administrator confirms the multi-disciplinary team's assessment.

IV. There is an instructional relation within and without SES programs.

However, these relations have not yet been delineated with any clarity.

Third, granting the first above is accomplished, then the H function (amount of information) can be calculated for System Demand, System Resource, System Supply and System Depletion. And the T function (amount of shared information) can be calculated for System Demand Transmission, School Supply Transmission, School Demand Transfer, and School Supply Transfer. This will depend on data which applies to individual children which can be collated. Such data systems are under development.

Finally, if affect relations can be more adequately specified along with a clear description of the organization components, then hypotheses relating to graph theory and organizational communication channels can be addressed.

The relation of SIGGS Model and evaluation

The point of collecting this type of information and analyzing it is to provide more adequate theory for formative evaluation activities. Formative evaluation is a type of evaluation where the data, values, decision rules, options, potential decisions and forecast are presented to a decision maker to be used in guiding the course of an educational program for which he or she is responsible. Confirming or disconfirming information theoretic or graph theoretic hypotheses will provide more adequate representations of the system operations as it relates to children entering, leaving and being taught within the system.

For example, hypothesis 90 ("If school demand increases, then school centralness decreases") can be cast in terms of school demand as outlined in the previous section and in terms of concentration of communication channels through which demand transfer (the multi-disciplinary process) takes place. Intuitively looking at the multi-disciplinary team situation, this hypothesis may very well be confirmed, multi-disciplinary teams operate pretty much independently and it is only after the team has completed its work that the coordinator gets much of a chance to affect the team's operations. As a result, program support teachers, psychologists and social workers have been used to provide alternative channels of information to coordinators.

In time the situation described by hypothesis 105 ("If school centralness increases, then school demand decreases.") may come about because coordinators may decide to re-establish control by concentration of channels of information. (In one sense the data system describing the multi-disciplinary team may provide the beginnings of this move.) As an evaluator, one could advise administrators that inserting a

requirement that approval be gathered before a referral is examined, may reduce the number of children referred. The evaluator could recommend an alternative of providing more bi-directional channels and hence control the inflow of students via controlling the multi-disciplinary team process rather than restricting the flow of incoming referrals. (See hypotheses 105, 107, 108, 109: respectively, "If school complete connectionness increases or school strongness increases, then school demand increases."; "If school complete connectioness increases or school strongness increases, then school resource increases."; "If school complete connectioness increases or school strongness increases, then school filtrationess decreases."; "If school complete connectioness increases or school strongness increases, then school spillageness increases.")

Assuming these hypotheses can be confirmed in data, then an evaluator who can provide alternatives of this sort can provide more elegant and insightful alternatives and the administrator can make more aware decisions.

Notes

(1) 1976 Budget, Madison Public Schools, Madison, WI.

(2) For convenience, all these are called 'teachers'.

(3) The first two have 'directors' with direct access to the superintendent.

(4) The use of the term 'and' implies that two different titles are on the same level.

(5) The SIGGS model has been described extensively elsewhere. Figure 1 and its associated variables are from: E.S. Maccia, G.S. Maccia, J.F. Andris, and K.R. Thompson. Development of educational theory derived from three educational theory models. Columbus, Ohio: The Ohio State University Research Foundation, December 1966, A report on Project No. 5-0638, Contract No. OE4-10-186.

Other papers in this symposium also provide access to literature on the SIGGS model as well as contacting the authors, E.S. Maccia and G.S. Maccia, School of Education, Indiana University, Bloomington, Indiana.

(6) Handicapping conditions are: Emotional Disturbance, Learning Disability, Speech or Language Disability, Hearing Impairment, Visual Disability, Pregnancy, Crippling or Orthopedic Disability; or any combination of these and others as the State Superintendent of Public Instruction identifies.

(7) The function of the Multi-disciplinary team is both to determine if a handicapping condition exists and to determine if supplemental or additional special educational services are required.

(8) In addition, Specialized Educational Services provides Speech and Language, School Psychology, School Social Work services to both regular and special education programs as well as being responsible for coordinating delivery of Nursing Services which are contracted with the city government. Finally, SES is responsible for screening children to determine if they have a suspected EEN.

(9) In the past (say four or five years ago) addition of a special education class to a school was likely to be resisted, and is still likely to be true for severe handicapping conditions. Currently, if SES plans to take a program out of a school, this is resisted. The basic adaption consists of making a more-or-less linear process look like a curriculum.

(10) See Lorenz, T.B., et al. MICA, Managed instruction with computer assistance: Level 5, An outline of the system's capabilities. Madison, WI: Madison Public Schools, Spring 1976. Madison Public Schools, Computer Managed Instruction, ESEA Title III Project (Operational Grant # 0281-1). For information, contact T.B. Lorenz or J.D. Chapin at Madison Public Schools

(1:) The H function is defined (note 5 page ff 17) as the sum, where i=1 to n, of the probability of each category times the log, base 2, of the inverse of the probability of each category.

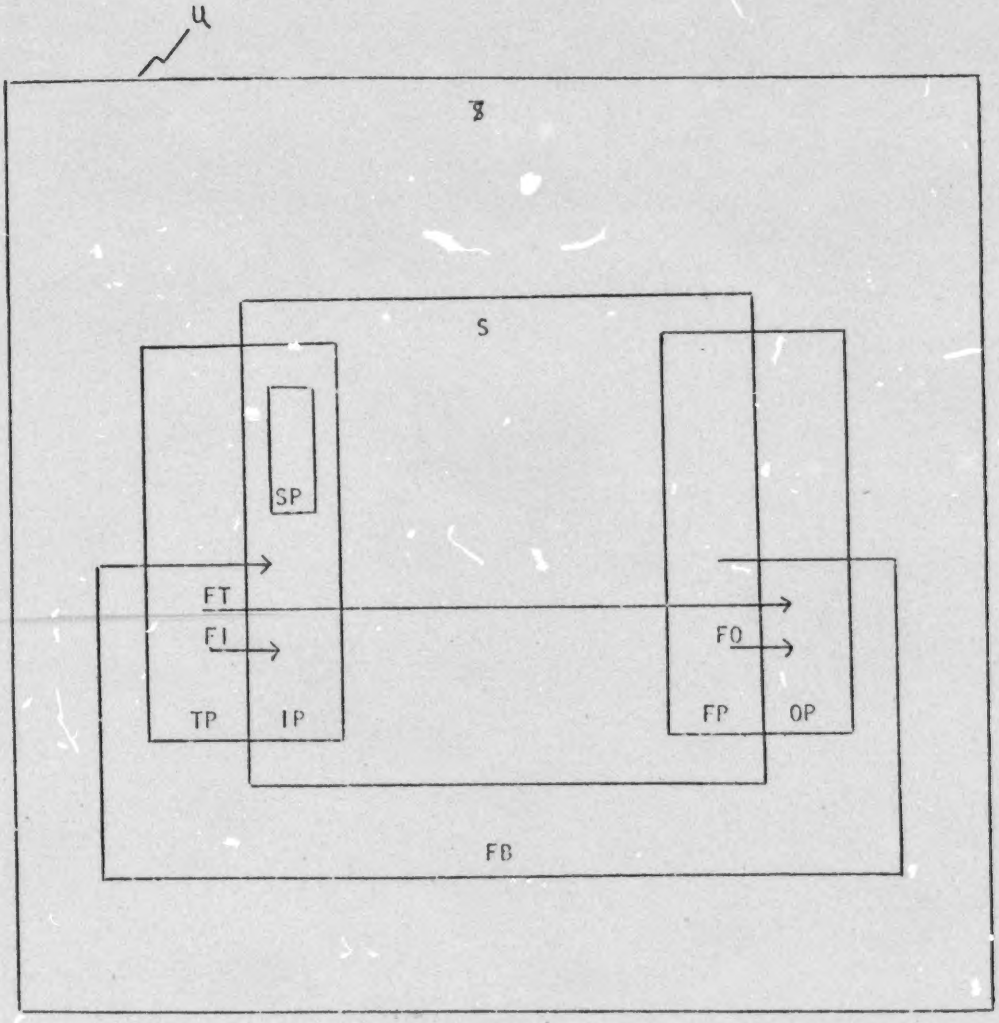
$$H(C) = \sum_{i=1}^{n} p(c_i) \log_2 \frac{1}{p(c_i)}$$

Where: C stands for classification
c stands for category
p stands for probability

And: the T function is defined as -

$$T(C_{IJ}) = H(C_I) + H(C_J) - H(C_{IJ})$$

Where: $H(C_{IJ}) = H(C_I) + H(C_J|C_I) = H(C_J) + H(C_I|C_J)$



(5)

Figure 1a

22. School demand, TP, 'TP' stands for toputness.

    22.1. School demand is school environmentness.

23. School resource, IP, 'IP' stands for inputness.

    23.1. School resource is a school with selective information.

24. School supply, FP, 'FP' stands for fromputness.

    24.1. School supply is a school's surroundings environmentness.

25. School depletion, OP, 'OP' stands for outputness.

    25.1. School depletion is a school's surroundings with selective information.

26. School storage, SP, 'SP' stands for storeputness.

    26.1. School storage is a school with school resource that is not school supply.

27. School demand transmission, FI, 'FI' stands for feedinness.

    27.1. School demand transmission is a transmission of school demand to a school.

28. School supply transmission, FO, 'FO' stands for feedoutness.

    28.1. School supply transmission is a transmission of school supply to a school's surroundings.

29. School demand transfer, FT, 'FT' stands for feedthroughness.

    29.1. School demand transfer is a transmission of school demand through a school to its surroundings.

30. School supply transfer, FB, 'FB' stands for feedbackness.

    30.1. School supply transfer is a transmission of school supply through a school's surroundings to a school.

31. School filtrationness, FL.

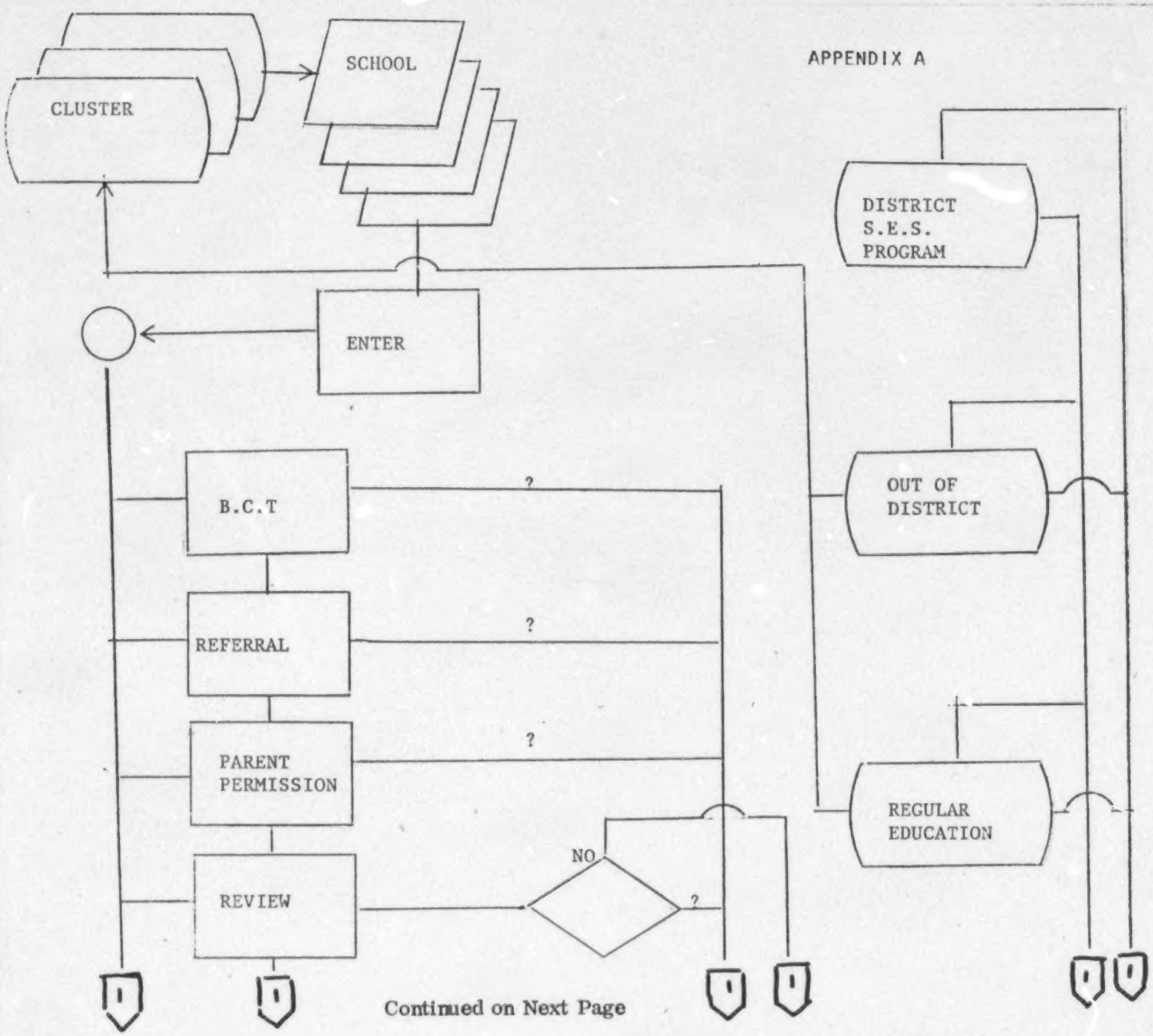
    31.1. School filtrationness is a restriction of school demand.

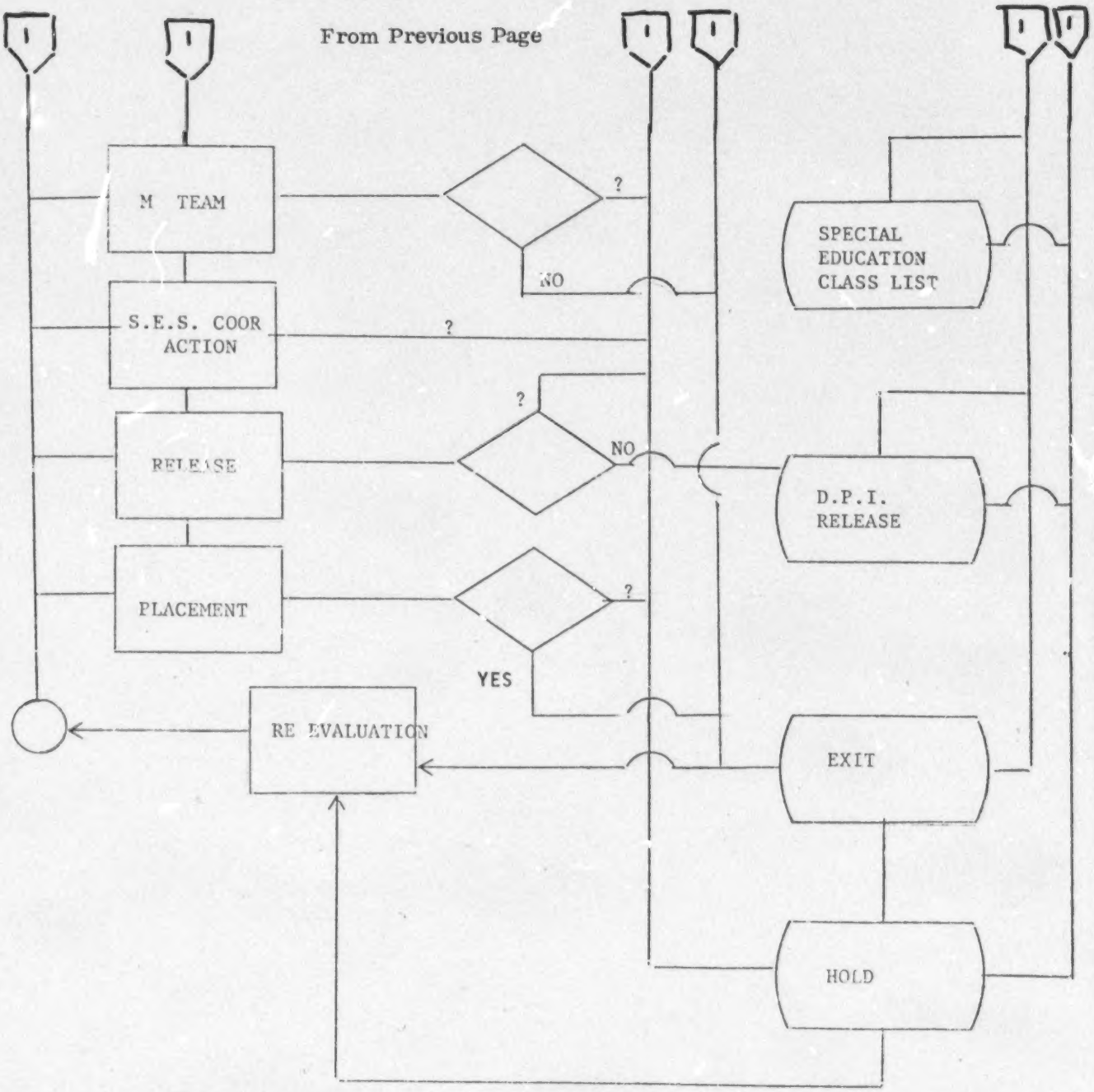
32. School spillageness, SL.

    32.1. School spillageness is a restriction of school demand transmission.

Figure 15

APPENDIX A


CLUSTER
SCHOOL
DISTRICT S.E.S. PROGRAM
ENTER
B.C.T
OUT OF DISTRICT
REFERRAL
PARENT PERMISSION
REGULAR EDUCATION
REVIEW
NO
?
?
?
?
Continued on Next Page


From Previous Page
M TEAM
?
NO
SPECIAL EDUCATION CLASS LIST
S.E.S. COOR ACTION
?
?
RELEASE
NO
D.P.I. RELEASE
PLACEMENT
?
YES
RE EVALUATION
EXIT
HOLD